

***I Claim:***

1 1. High-resolution sheet metal scanner using machine vision for checking the accuracy of  
 2 openings drilled or punched into a mechanical part, comprising:

3 a lower assembly which includes a housing which is environmentally sealed sufficiently  
 4 to exclude dust and contaminants; a planar scanning carriage assembly within said housing and  
 5 capable of producing controlled movement of a carriage member in two orthogonal directions in  
 6 a horizontal plane; a flat transparent support plate disposed on an upper side of said housing on  
 7 which said part is to be supported for viewing; and a camera assembly mounted on said carriage  
 8 member and oriented upwards including an imager for producing at least one line of pixels and  
 9 focussing means for focussing said imager upon an upper surface of said support plate;

10 a planar illuminator mounted above said lower assembly and providing a substantially  
 11 uniform light over an area coextensive with said support plate; and

12 control means coupled with said carriage assembly and with said camera assembly for  
 13 guiding said camera assembly in a controlled scanning pattern within said lower assembly  
 14 housing and processing image data of said part based on lines of pixels produced by said camera  
 15 assembly imager.

1 2. The high-resolution sheet metal scanner of Claim 1 wherein said camera assembly includes a  
 2 polarizing filter.

1 3. The high-resolution sheet metal scanner of Claim 1 wherein said illuminator includes a bank  
 2 of parallel fluorescent tubes.

1 4. The high-resolution sheet metal scanner of Claim 1 wherein said scanning carriage assembly  
 2 includes a first lead screw, a first stepper motor for controllably rotating said first lead screw, a  
 3 second lead screw, a second stepper motor for controllably rotating the second lead screw, first  
 4 and second stage rails arranged orthogonally and means for permitting said carriage to travel

5 along said first and second stage rails in accordance with rotation of said first and second lead  
6 screws.

1 5. The high-resolution sheet metal scanner of Claim 4 including first and second high-resolution  
2 tape encoders within said housing for determining X and Y location of said carriage.

1 6. The high-resolution sheet metal scanner of Claim 1 wherein said imager includes a linear  
2 imager producing one line of pixels at a time.

1 7. The high-resolution sheet metal scanner of Claim 1 including position adjusting means for fine  
2 adjustment of vertical position of said support plate.

1 8. The high-resolution sheet metal scanner of Claim 1 wherein said control means includes  
2 means to adjust the dimensions of scan to the size of the part.

1 9. The high-resolution sheet metal scanner of Claim 1 wherein said lower assembly further  
2 includes motion damping support means to minimize effects of floor vibration on action of the  
3 scanning carriage assembly.

1 10. The high-resolution sheet metal scanner of Claim 9, wherein said motion damping means  
2 includes means for tuning to damp out specific frequencies.

1 11. The high-resolution sheet metal scanner of Claim 1, wherein said scanning carriage assembly  
2 includes respective first and second timing belts and pulleys acting in first and second orthogonal  
3 directions, first and second stepper motors operatively coupled to the first and second timing  
4 belts, respectively, first and second-stage rails arranged orthogonally and means for permitting  
5 said carriage to travel along said first and second stage rails in accordance with rotation of said  
6 first and second timing belts.